

18. Use Big-M method to solve

$$\text{Minimize } z = 4x_1 + 3x_2$$

Subject to constraints

$$2x_1 + x_2 \geq 10$$

$$-3x_1 + 2x_2 \leq 6$$

$$x_1 + x_2 \geq 6$$

$$\text{and } x_1, x_2 \geq 0$$

19. Obtain initial basic feasible solution of a Transpiration Problem whose cost and rim requirement table is the following.

Origin/Destination	D ₁	D ₂	D ₃	Supply
O ₁	2	7	4	5
O ₂	3	3	1	8
O ₃	5	4	7	7
O ₄	1	6	2	14
Demand	7	9	18	34

20. A company wishes to assign 3 jobs to 3 machines in such a way that each job is assigned to some machines and no machine works on more than one job. The cost of assigning job i to machine j is given matrix as:

Cost Matrix:

8	7	6
5	7	8
6	8	7

Find the LPP?

APRIL/MAY 2023

**CASC32/BASC32/UASC32 —
QUANTITATIVE TECHNIQUES - I**

Time : Three hours

Maximum : 75 marks

SECTION — A (10 × 2 = 20 marks)

Answer ALL Questions.

1. Define: "Operations Research".
2. What is the scope of operation research?
3. What is meant LPP?
4. Write a note on basic feasible solution.
5. What is a slack variable?
6. Write a note on North – West Corner Method.
7. Define: "Transportation Problem".
8. What are the basic steps involved in solving a transportation problem?
9. Give the areas of operations of Assignment Problem?
10. How to you convert the unbalanced assignment problem into a balanced one?

SECTION — B ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Write down the Applications of Operations Research.

Or

- (b) What are the scientific methods in Operation Research? Explain.

12. (a) List any four requirement of employing Linear Programming Problem techniques.

Or

- (b) Solve the following LPP by graphical method.

$$\text{Minimize } Z = 20x_1 + 10x_2$$

$$\text{Subject to } x_1 + 2x_2 \leq 40$$

$$3x_1 + x_2 \geq 30$$

$$4x_1 + 3x_2 \geq 60$$

$$x_1, x_2 \geq 0$$

13. (a) Write down the advantages of linear programming.

Or

- (b) Find the initial basic feasible solution for the following transportation problem by VAM.

		Distribution Centers				Availability
		D ₁	D ₂	D ₃	D ₄	
Origin	S ₁	11	13	17	14	250
	S ₂	16	18	14	10	300
	S ₃	21	24	13	10	400
Requirements		200	225	275	250	

14. (a) When does degeneracy happen in Transportation Problem?

Or

- (b) Solve the transportation problem.

		Destination				Supply
		A	B	C	D	
Source	1	11	20	7	8	50
	2	21	16	20	12	40
	3	8	12	18	9	70
Demand		30	25	35	40	

15. (a) Write the assignment algorithm in operations research.

Or

- (b) Distinguish between the Unbalanced and Balanced assignment problem.

SECTION — C ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain the procedure for mathematical formulation of an LP problem.

17. Express the following LP problem in standard form

$$\text{Minimize } z = 5x_1 + 7x_2$$

Subject to constraints

$$x_1 + x_2 \leq 8$$

$$3x_1 + 4x_2 \geq 3$$

$$6x_1 + 7x_2 \geq 5$$

$$\text{and } x_1, x_2 \geq 0$$